



Australian
National
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CAEPR Indigenous Population Project 2011 Census Papers

Paper 15
**Indigenous and Non-Indigenous
Marriage Partnerships**

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The 2011 Census Paper Series

In July 2012, the Australian Bureau of Statistics began releasing data from the 2011 Census of Population and Housing. One of the more important results contained in the release was the fact that the number of people who identified as being Aboriginal and/or Torres Strait Islander (Indigenous) had increased by 20.5 per cent since the 2006 Census. There were also significant changes in the characteristics of the Indigenous population across a number of key variables including language spoken at home, housing, education, and other socioeconomic variables.

In this series, authors from the Centre for Aboriginal Economic Policy Research (CAEPR) document the changing composition and distribution of a range of Indigenous outcomes. The analysis in the series is funded by the Commonwealth Department of Social Services (DSS) (formerly the Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA)) through the Strategic Research Project as well as DSS/ FaHCSIA and State/Territory governments through the Indigenous Populations Project.

The opinions expressed in the papers in this series are those of the author alone and should not be attributed to DSS or any other government departments.

CAEPR Indigenous Population Project
2011 Census Papers
No. 15/2013

<http://caepr.anu.edu.au/publications/censuspapers.php>

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Abstract

The Indigenous population is projected to continue to grow at a much faster rate than the non-Indigenous population over at least the next 20 years. One explanation for this rapid growth is a high rate of mixed marriage partnerships with the children of these partnerships tending to be identified as Indigenous. In 2011, 56.5 per cent of partnered Indigenous males had a non-Indigenous partner, slightly lower than the corresponding figure of 59.0 per cent for Indigenous females. These percentages represent a steady increase from the previous 2006 Census, rising from 52.4 per cent and 55.5 per cent respectively. In some of our largest cities (like Sydney, Brisbane, Melbourne, Adelaide, Newcastle and the Gold Coast), these rates exceed 75 per cent. Across areas, variation in mixed partnering is explained to a large extent by the share of the partnered population in the area who are non-Indigenous. It would appear that in certain areas, differences in socioeconomic outcomes and industry of employment are barriers to the type of social interaction that might lead to mixed partnerships. The main implication is that policies to improve the outcomes for Indigenous Australians cannot simply focus on the Indigenous population, when, for example, close to half of the Indigenous child population in many urban areas have a non-Indigenous mother.

Acknowledgements

A number of comments on this paper were received from and/or collated by members of the Steering committee of the Indigenous Populations Project, and were much appreciated. At CAEPR, thanks go to John Hughes for editorial input and Annick Thomassin for layout.

Acronyms

ABS	Australian Bureau of Statistics
ARC	Australian Research Council
ASGS	Australian Statistical Geographic Standard
CAEPR	Centre for Aboriginal Economic Policy Research
DSS	Department of Social Services
FaHCSIA	Department of Families, Housing, Community Services and Indigenous Affairs
GLM	Generalised Linear Model
OLS	Ordinary Least Squares
PINIRSEO	Pooled Indigenous and Non-Indigenous Relative Socioeconomic Outcomes index
SA1	Statistical Area Level 1
SUA	Significant Urban Areas

Introduction and overview

Understanding the size, distribution and growth of the Aboriginal and Torres Strait Islander (Indigenous) population is a key input into policy formulation in Australia. Prior to European exploration and colonisation, Indigenous peoples occupied all parts of the continent as well as the island of Tasmania. They developed a diverse range of hunter-gatherer economies and societies that were well suited to the wide variety of Australian climates and ecosystems (Butlin 1993). Overall these were low-growth, stable populations with densities tied to environmental carrying capacity. Recent scientific estimates by Mulvaney and Kamminga (1999) using available knowledge of the capacity of the Australian continent to support the Indigenous economy produced a population range of 750,000 to 800,000 at the time of European colonisation.

Estimates of the Indigenous population based on the 1901 Census at the time of Australian Federation indicate a population of 93,000 (Smith 1980). Even taking into account the potential for large undercount in this and other early censuses, a comparison of the 1901 estimate and generally accepted 1788 estimates indicates a precipitously large population decline over the colonial period. Mulvaney (2002) identifies three reasons for this decline: the introduction of European diseases; decreased fertility due to disruptions to the Indigenous economy; and frontier violence. Based on analysis in Reynolds (1987), Mulvaney (2002) suggests an estimate of up to 40,000 deaths from the latter. While this is large relative to population size, it nonetheless suggests that much of the decline in the Indigenous population was due to the first two (demographic) factors.

While Indigenous population estimates have been variable in quality and coverage, available population counts suggest that the population did not stabilise until the middle part of the twentieth century. By 1971, the Indigenous population count was only around 116,000, barely above the 1901 count (especially when one takes into account the poor coverage at the time of Federation). Since 1971 though, the Indigenous population has grown extraordinarily rapidly, with a population count of around 549,000 according to the 2011 Census. At an annualised rate of 4.0 per cent, this is well beyond the bounds of natural increase.

As the Indigenous population has grown, so too has the sophistication with which the Australian Bureau of Statistics (ABS) creates their population estimates and the quality of data with which to make projections. It is estimated that in 2011, there were around 670,000 Indigenous Australians, 22.0 per cent higher than the associated population count mentioned above (due to the

incorporation in the population estimate of those who were missed from the census and allocation of those who did not state their Indigenous status). In a previous paper in this series (Biddle 2013a), it was projected that this figure would grow to around 1,060,000 in 2031. Nearly 250 years after colonisation, the Indigenous population is projected to be more or less back to where it started.

There are four main reasons for the remarkable growth in the Indigenous population that occurred over the 40 years since Indigenous Australians were properly enumerated in the census, and which is projected to occur over the next 20 years—declining mortality rates (though they are still high relative to the non-Indigenous population), high fertility rates (births of Indigenous children to Indigenous mothers), changes in the propensity to identify as Indigenous, and births of Indigenous children to non-Indigenous mothers. The first two of these factors have been the focus of official population analyses (ABS 2009a, 2009b). The third factor has received a little less attention (with some notable exceptions including Hunter & Dungey 2006) but does appear to have explained much of the recent growth in the Indigenous population (Biddle 2012). The fourth factor, births to non-Indigenous mothers, has received less attention still.

In 2011, the ABS estimates a total of 301,617 births in Australia. Of these, 17,621 (or 5.8%) were registered as being Indigenous, a much higher percentage than the share of the total population estimated as being Indigenous (around 3.0%) based on the 2011 Census. However, 4,747 of these births (or 26.9%) were to a non-Indigenous mother.

There are three related reasons for the high number of births of Indigenous children to non-Indigenous mothers. First, Indigenous males tend to have high rates of paternity across the age distribution. Regardless of whether they are partnered with an Indigenous or non-Indigenous female, Indigenous males tend to have a larger number of children than their non-Indigenous counterparts (Biddle & Yap 2010). The clear implication of this is that a non-Indigenous woman partnered with an Indigenous man will have a greater number of children on average than one partnered with a non-Indigenous man.

Second, most children from mixed partnership will end up being identified as Indigenous (no matter which parent is Indigenous) and therefore mixed partnerships where the father is Indigenous may have an additional effect on population growth (ABS 2009a; Peterson & Taylor 2002). This may change after relationship breakdown (especially if the non-Indigenous partner is granted custody), but also may change back once that child reaches adulthood and is responsible for their own identification.

The third reason for such high numbers of births is that Indigenous Australians have quite high rates of exogamy. In 2011, 56.5 per cent of partnered Indigenous males had a non-Indigenous partner, slightly lower than the corresponding figure of 59.0 per cent for Indigenous females. These percentages represent a steady increase from the previous 2006 Census, rising from 52.4 per cent and 55.5 per cent respectively. As will be shown later in this paper, these national statistics hide substantial variation within Australia.

The most obvious effect of these births has already been discussed—a more rapid growth in the Indigenous Australian population than would otherwise have been the case. However, there are also a number of other second-order effects of comparable importance. First, the geographic distribution of exogamy rates has an impact on the geographic distribution of population growth.

A further reason why such births and by extension mixed partnerships are of interest is the potential effect on the government's policy targets. In 2008, the Australian government committed itself to six 'Closing the Gap' targets related to reductions in socioeconomic disparities between the Indigenous and non-Indigenous populations (FaHCSIA 2009). Four of these are directly related to the outcomes of Indigenous children and youth—to halve the gap in mortality rates for Indigenous children under five within a decade; to ensure access to early childhood education for all Indigenous four-year-olds in remote communities within five years; to halve the gap in reading, writing and numeracy achievements for children within a decade; and to halve the gap for Indigenous students in Year 12 attainment or equivalent attainment rates by 2020. Assessing the likelihood of these targets being achieved through the calculation of dependency ratios and the potential for intergenerational transfer of poverty and low socioeconomic outcomes is made more complicated by high rates of intermarriage (O'Reilly 1994: 154). The dependency of Indigenous children cannot simply be related to aggregates such as the number of working-age Indigenous parents, as significant numbers of non-Indigenous parents also contribute to the support of Indigenous children.

The individual data that would allow for an analysis of the characteristics of children with an Indigenous and non-Indigenous partner—the 5% Census Sample File—will not be available until the end of 2013. However, it is possible to look at the geographic distribution of mixed Indigenous and non-Indigenous partnerships, and this is the focus of the current paper.

The analysis begins with a description of the data and then a comparison of mixed partnerships across the age

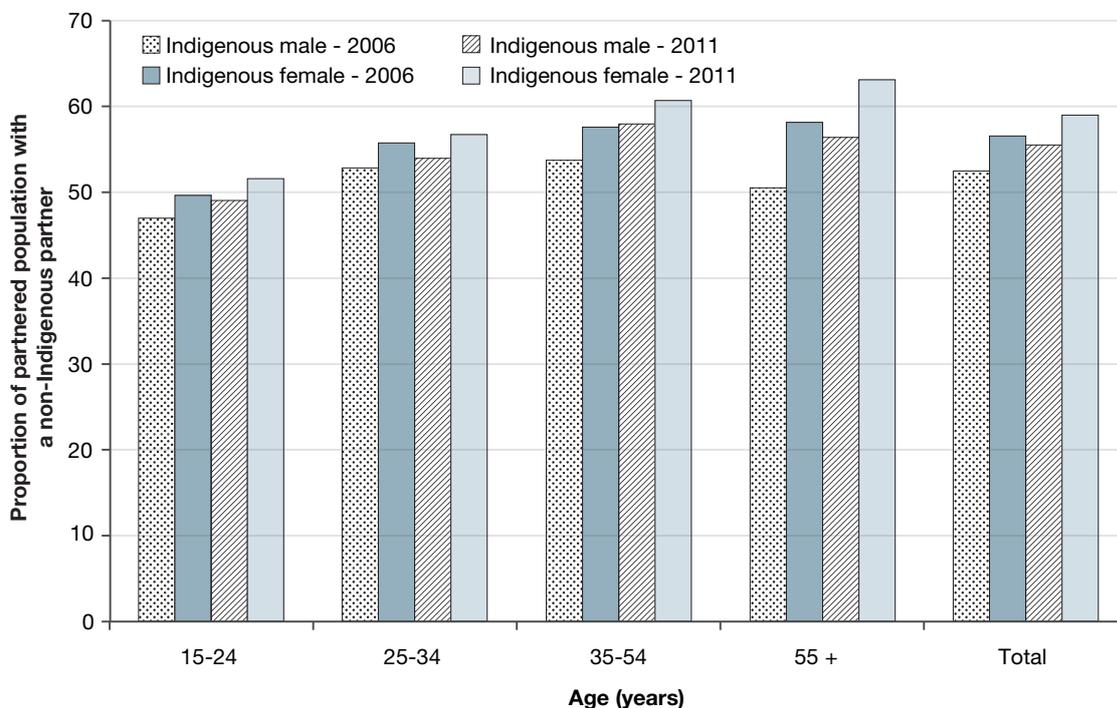
distribution. This is followed by a geographic analysis of mixed partnerships with the focus being a collection of Significant Urban Areas, a new geographical classification introduced as part of the 2011 Australian Statistical Geographical Standard (ASGS). Specifically, I select 43 Significant Urban Areas (SUAs) that have a total population of between 10,000 and 250,000, of whom at least 1,000 are Indigenous. These have been defined previously (Biddle & Markham 2013) as regional centres. These are analysed alongside 11 major cities with a population of 250,000 usual residents or more. The final section of the paper uses data for Indigenous Areas, the middle level of geography in the Indigenous Structure of the ASGS, and considers some of the geographic factors that are associated with the rate of mixed partnerships.

Mixed partnerships across the age distribution

Marriage, broadly defined, is a central feature of traditional Indigenous societies and has importance for family formation and cultural maintenance (Berndt & Berndt 1985). However, census data seems to suggest that Indigenous males and females are less likely to be legally married than their non-Indigenous counterparts. Specifically, Yap and Biddle (2012) showed that in 2011, 23.3 per cent of Indigenous Australians aged 15 years and over reported being married in a registered marriage, compared to 49 per cent of the non-Indigenous population. It is important to keep in mind though that the notion of marriage may be quite different in some Indigenous societies within Australia (Australian Law Reform Commission 1986) with less importance placed on legal registration. This is also backed up by the data with Yap and Biddle (2012) showing that 16 per cent of Indigenous Australians (15 years and over) reported being married in a de facto marriage compared to 9 per cent for non-Indigenous Australians.

In this paper, a reasonably broad definition of partnership is used which combines those in either a registered or de facto marriage. In total, adequate information from the census is available on around 56,000 Indigenous males and around 59,000 female partnered Indigenous Australians aged 15 years and over. Excluded from the analysis because they are out of scope are Indigenous Australians who do not have a partner according to the census. However, it is also necessary to exclude a number of other groups who would otherwise be in scope but can not be included based on a lack of information on the data set available for the analysis, including those who were away from home on the night of the census, those who are part of a same-sex couple, or Indigenous Australians whose partner did not state their Indigenous status. All four

FIG. 1. Proportion of opposite-sex, partnered Indigenous Australians with a non-Indigenous partner, by age and sex, 2006 and 2011



Source: Customised calculations based on the 2006 and 2011 Censuses.

groups are worthy of study, but unfortunately are not able to be included in the analysis in this paper.

Looking at those who are in scope though, Fig. 1 gives the percentage of the relevant partnered Australian Indigenous population who have a non-Indigenous partner. Results are presented by age and sex for 2006 and 2011.

The 'Total' columns in Fig. 1 show that there was an increase in the proportion of partnered Indigenous Australians who had a non-Indigenous partner between 2006 and 2011. While increases were found for all age groups, the biggest increase was amongst those aged 55 years and over. Indeed, for Indigenous males, this age group has gone from having a slightly lower rate of mixed partnership than the all-ages average in 2006 to having a higher rate than average in 2011.

The lowest rate of mixed partnership occurs in the 15–24 year age group. Remembering that Fig. 1 is only those who are partnered, this result probably stems from the relatively low rates of marriage amongst the non-Indigenous population of that age demonstrated in Yap and Biddle (2012). That is, there are fewer non-Indigenous Australians in that age group who are available for partnership, meaning that those Indigenous Australians who are partnered will tend to have an Indigenous partner.

Mixed partnerships across regional centres and major cities

Although there is some important variation, the data presented in the previous section showed that mixed partnerships occur at a reasonably similar rate across the age distribution. This is not true, however, in terms of geography. Rather, the majority of Indigenous Australians with a non-Indigenous partner are living in urban parts of the country. This is demonstrated in Table 1 below, which presents the percentage of partnered Indigenous males and females with a non-Indigenous partner in 11 major cities. For comparison, these rates are presented alongside the percentage of partnered non-Indigenous Australians with an Indigenous partner in the same cities.

As a percentage of the partnered Indigenous population, Indigenous Australians in mixed partnerships varied from 63.6 per cent amongst males in Perth to 88.3 per cent amongst Indigenous females in the Sunshine Coast. Clearly though, the vast majority of partnered Indigenous Australians in major cities have a non-Indigenous partner. Not surprisingly, this was not the case amongst the non-Indigenous population. Only a very small percentage of partnered non-Indigenous Australians living in a major city had an Indigenous partner, ranging from only 0.2 per cent of those living in Melbourne to 1.3–1.4 per cent of

TABLE 1. Indigenous and non-Indigenous Australians in a mixed partnership in 11 major cities, 2011^a

Urban area	Indigenous				Non-Indigenous	
	Male		Female		Male	Female
	Number	Per cent	Number	Per cent	Per cent	Per cent
Sydney	3,685	83.4	3,879	84.1	0.5	0.4
Brisbane	3,235	81.6	3,491	82.7	0.9	0.8
Perth	1,472	63.6	1,561	65.0	0.4	0.4
Melbourne	1,595	85.0	1,600	85.0	0.2	0.2
Newcastle—Maitland	1,201	82.5	1,363	84.3	1.4	1.3
Adelaide	984	75.8	1,097	77.7	0.4	0.4
Gold Coast—Tweed Heads	905	86.6	902	86.6	0.8	0.8
Central Coast	819	87.3	829	87.4	1.3	1.3
Canberra—Queanbeyan	636	82.0	627	81.7	0.7	0.7
Wollongong	525	84.5	557	85.3	1.0	0.9
Sunshine Coast	481	88.3	474	88.1	0.7	0.7

Note: a. Excludes those who were away from home on the night of the census, those who are part of a same-sex couple, or those whose partner did not state their Indigenous status.

Source: Customised calculations using the 2011 Census.

those living in the Central Coast and Newcastle-Maitland. However, while still not common, **Table 2** shows that there were a few regional centres where a non-Indigenous Australian might have a reasonable likelihood of having an Indigenous partner.

There was a much greater variation within regional centres in terms of mixed partnerships than found in major cities. Specifically, there were 33 regional centres where the majority of partnered Indigenous males had a non-Indigenous partner and 34 where this was the case for females. The largest percentages were in Geelong with 85.7 per cent and 87.0 per cent of partnered Indigenous males and females living in a mixed partnership. At the other end of the distribution, there were 11 regional centres where the majority of Indigenous males had an Indigenous partner and 10 regional centres where this was the case for Indigenous females. The lowest percentage for males was in Broome, where a little over a quarter (25.2%) of Indigenous males had a non-Indigenous partner. Interestingly, the rate of mixed partnership for females in Broome was significantly higher (35.0%) than for males, with the lowest rate for females being in Port Hedland (26.8%).

Once again, living in a mixed partnership was far from the norm for the non-Indigenous population in regional centres. Dubbo, Mount Isa and Broome had the highest percentages for the non-Indigenous population. However, percentages rarely approach 4 or 5 per cent.

In total there were 15,538 Indigenous males and 16,380 females with a non-Indigenous partner in Australia's 11 major cities counted in the 2011 Census. There were a further 9,538 males and 10,486 females in the 43 regional centres identified and discussed in Biddle and Markham (2013). Together this makes up 79.7 per cent and 77.4 per cent of the total Indigenous population identified in the Census as being in a mixed partnership, much higher percentages than the 62.0 per cent of in scope partnered Indigenous males and 61.6 per cent of in scope partnered Indigenous females living in these urban centres.

TABLE 2. Indigenous Australians in a mixed partnership in 43 regional centres, 2011^a

Urban area	Indigenous				Non-Indigenous	
	Male		Female		Male	Female
	Number	Per cent	Number	Per cent	Per cent	Per cent
Cairns	462	41.0	559	45.6	2.3	1.9
Darwin	519	52.2	616	56.5	3.0	2.6
Hobart	811	82.5	872	83.5	1.8	1.7
Townsville	551	57.8	547	57.6	1.7	1.7
Rockhampton	358	65.7	392	67.7	1.9	1.8
Devonport	384	81.7	447	83.9	2.7	2.3
Dubbo	287	57.2	260	54.7	3.7	4.1
Tamworth	312	67.8	339	69.6	3.1	2.9
Burnie—Wynyard	328	72.2	331	72.4	3.5	3.5
Nowra—Bomaderry	316	74.0	366	76.7	1.9	1.7
Mackay	319	71.7	323	71.9	1.8	1.8
Launceston	348	83.7	399	85.4	1.6	1.4
Coffs Harbour	288	68.7	284	68.4	1.4	1.5
Toowoomba	297	73.3	314	74.4	1.3	1.2
Alice Springs	114	34.0	143	39.3	3.8	3.1
Hervey Bay	242	75.4	256	76.4	1.3	1.2
Maryborough	242	75.4	256	76.4	1.3	1.2
Mount Isa	104	34.6	155	44.0	4.8	3.3
Geraldton	117	39.3	134	42.5	2.1	1.8
Bundaberg	217	72.8	229	73.9	1.2	1.2
Shepparton—Mooroopna	211	69.2	199	67.9	0.8	0.8
Broome	65	25.2	104	35.0	5.7	3.6
Port Macquarie	224	78.9	210	77.8	1.3	1.4
Bunbury	160	63.5	188	67.1	0.8	0.7
Wagga Wagga	190	72.5	196	73.1	1.7	1.7
Cessnock	213	84.2	225	84.9	2.3	2.1
Grafton	158	64.5	184	67.9	1.8	1.6
Port Hedland	67	26.3	69	26.8	3.4	3.3
Gladstone—Tannum Sands	177	76.6	220	80.3	1.8	1.5
Mildura—Wentworth	131	54.8	139	56.3	1.2	1.1
Orange	173	71.8	176	72.1	1.6	1.6
Albury—Wodonga	151	70.2	199	75.7	0.7	0.5
Taree	153	69.9	184	73.6	1.9	1.6
Port Augusta	66	30.7	59	28.4	2.7	3.0
Kalgoorlie—Boulder	69	34.3	88	40.0	1.6	1.3
Broken Hill	89	46.8	109	51.9	2.9	2.4
Geelong	138	85.7	154	87.0	0.4	0.3
Lismore	109	69.0	115	70.1	1.4	1.4
Bathurst	87	70.7	120	76.9	1.7	1.2
Bendigo	111	82.2	112	82.4	0.6	0.6
Armidale	52	41.3	66	47.1	1.6	1.3
Ballarat	73	80.2	93	83.8	0.5	0.4
Albany	55	56.1	55	56.1	0.8	0.8

Note: a. Excludes those who were away from home on the night of the census, those who are part of a same-sex couple, or those whose partner did not state their Indigenous status.

Source: Customised calculations using the 2011 Census.

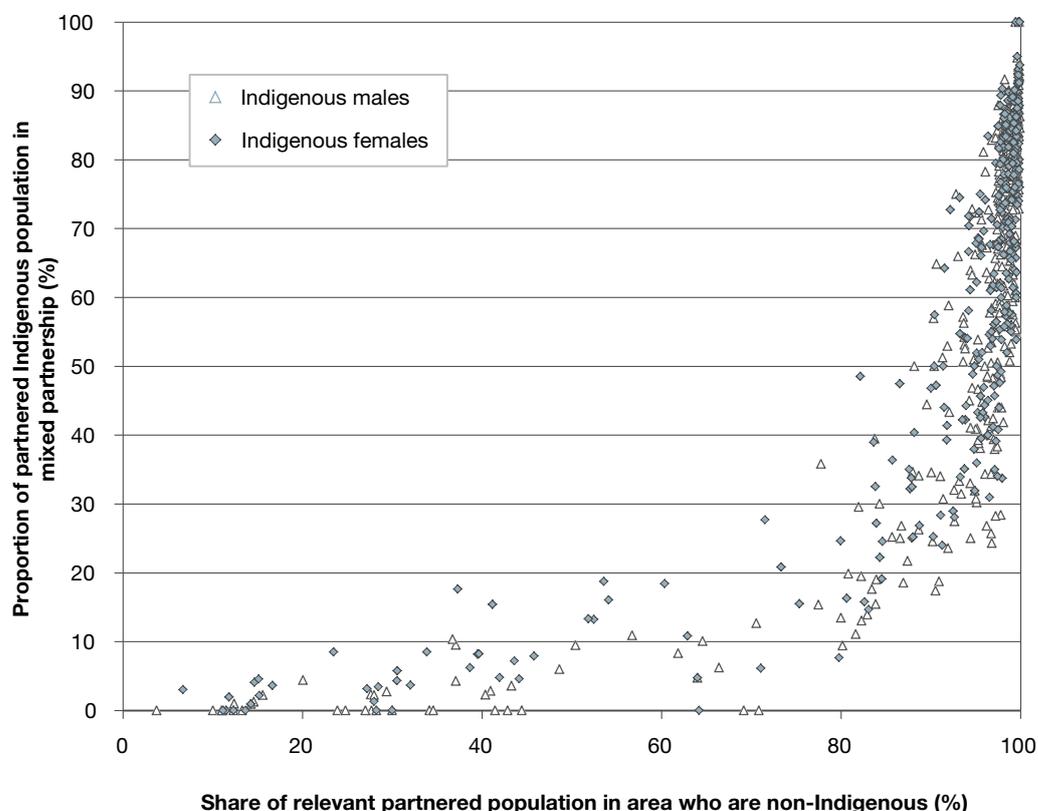
Relationship between mixed partnerships and area characteristics

It is clear from the analysis presented in Heard, Birrel and Khoo (2009) that there is a strong relationship between the percentage of the population in an area who is non-Indigenous and the rate of mixed partnerships. This finding is not surprising, as many people find their partner amongst those who live in relatively close proximity (Houston et al. 2005). If an Indigenous person is living in a community, town or city with relatively few other Indigenous people from which to identify a partner from, then it is more likely that they will partner with a non-Indigenous person. Similarly, a non-Indigenous person living in an area that has a relatively large share of the population who are Indigenous will likely have a much greater level of social interaction with Indigenous Australians, and would therefore be more likely to have a partner who is Indigenous.

This relationship between Indigenous share in the area and the rate of mixed partnerships is demonstrated in Fig. 2. The horizontal axis represents the percentage of the partnered population of the opposite sex in the area who identified as being non-Indigenous. This is plotted against the percentage of the partnered Indigenous population who is in a mixed partnership. Results are presented for 368 ABS Indigenous Areas, with a separate observation for males and females—736 observations in total. In order to avoid distortions due to small cell size, areas with less than 100 non-Indigenous or less than 100 Indigenous Australians in the area are excluded from the analysis. There are 40 Indigenous Areas (mainly in remote Australia) excluded based on this cut-off. However, results do not change qualitatively if they are included.

Although the relationship does not appear to be linear, results presented in Fig. 2 demonstrate a clear correlation between the percentage of the partnered population in an Indigenous Area who are non-Indigenous and the percentage of the Indigenous population in that area who

FIG. 2 Relationship between population in an area who are non-Indigenous and Indigenous Australians in mixed partnership^a



Note: a. Excludes those who were away from home on the night of the census, those who are part of a same-sex couple, or those whose partner did not state their Indigenous status.

Source: Customised calculations using the 2011 Census.

are in a mixed partnership. The relationship is slightly stronger for females (correlation coefficient = 0.78) than for males (correlation coefficient = 0.76), but for both sexes, it is clear from the data that whether or not an Indigenous person is in a mixed partnership is strongly determined by the percentage of Indigenous people in their locality.

While Fig. 2 demonstrates a strong relationship between mixed partnerships and non-Indigenous population share, this relationship does not appear to be linear. Furthermore, there are only four areas (all towards the right of the distribution) where the rate of mixed partnerships exceeds the relevant non-Indigenous share in the area (Sydney—Lower North; Woollahra—Waverley; Upper Goulburn Valley; and Adelaide—Prospect—Walkerville).

The relative strength or weakness of this relationship can be used as one indication of the social interaction between Indigenous and non-Indigenous Australians within a city or regional centre (Houston et al. 2005: Heard, Birrell & Khoo 2009). If, for example, there were high rates of

social interaction and Indigenous males in opposite-sex partnerships made no distinction between Indigenous and non-Indigenous females in their choice of partner, then their rate of mixed partnership would be the same as the per cent of the partnered female population in the area who identified as being non-Indigenous. This can be thought of as the default rate. Areas that had higher rates than this would indicate a relatively high rate of social interaction with non-Indigenous females whereas rates that are lower would indicate a relatively low rate of social interaction. For Indigenous females in opposite-sex partnerships, the predicted rates of mixed partnership under the default scenario would be based on the per cent of partnered males in the area who are Indigenous. For non-Indigenous population, default rates would be based on the share of the partnered population who are Indigenous.

A ranking of urban centres based on deviation from this default rate is presented in Table 3. Specifically, the actual rate of mixed partnerships for Indigenous and non-

TABLE 3. Ranking of social interaction between Indigenous and non-Indigenous Australians in opposite-sex partnering decisions and average difference between actual and default^a

Sunshine Coast	88.9	Bendigo	82.8	Taree	73.9	Darwin	57.4
Central Coast	88.7	Canberra—Queanbeyan	82.6	Mackay	73.6	Albany	56.9
Gold Coast—Tweed Heads	87.4	Gladstone—Tannum Sands	80.9	Orange	73.5	Mildura—Wentworth	56.7
Geelong	86.9	Port Macquarie	79.8	Tamworth	71.8	Broken Hill	52.3
Cessnock	86.8	Nowra—Bomaderry	77.5	Lismore	71.0	Armidale	45.9
Launceston	86.4	Adelaide	77.3	Coffs Harbour	70.0	Cairns	45.6
Wollongong	85.9	Hervey Bay	77.2	Shepparton—Mooroopna	69.4	Mount Isa	43.9
Devonport	85.7	Maryborough	77.2	Rockhampton	68.6	Geraldton	42.9
Melbourne	85.2	Bathurst	76.7	Grafton	68.1	Alice Springs	40.3
Newcastle—Maitland	85.0	Burnie—Wynyard	75.8	Bunbury	66.3	Kalgoorlie—Boulder	38.8
Hobart	84.8	Toowoomba	75.2	Perth	64.8	Broome	35.2
Sydney	84.3	Bundaberg	74.6	Dubbo	60.0	Port Augusta	32.4
Ballarat	83.4	Albury—Wodonga	74.6	Townsville	59.5	Port Hedland	29.9
Brisbane	83.1	Wagga Wagga	74.5				

Note: a. Excludes those who were away from home on the night of the census, those who are part of a same-sex couple, or those whose partner did not state their Indigenous status.

Source: Customised calculations using the 2011 Census.

Indigenous males and females is divided by the default rate based on the share of the relevant partnered population who is either non-Indigenous or Indigenous. That is, the mixed partnership rate for Indigenous males is divided by the per cent of partnered females who are non-Indigenous. I then perform the same calculations for Indigenous females, non-Indigenous males and non-Indigenous females. Finally, I rank the 54 urban centres based on the average of this ratio for the four groups.

The urban centre with the biggest average difference between the observed and default rate of mixed partnerships is Port Hedland. In this urban centre, Indigenous and non-Indigenous males and females have a rate of mixed partnership that is about 29.9 per cent of what would be expected based on the relative percentages in the area. Other urban centres with much lower than expected rates of mixed partnerships are Broome and Port Augusta. At the other end of the distribution, the Sunshine Coast, Gold Coast and Central Coast all have relatively high rates of mixed partnerships, albeit rates that are still only 87.3–88.9 per cent of what would be expected based on the relative percentages in the area.

Unlike indices of socioeconomic outcomes or wellbeing, the ranking of social interaction in **Table 3** is in no way an indication of good or bad outcomes. There are a number of quite valid reasons for why an Indigenous/non-Indigenous person might have a relative preference for partnering with someone who has a similar identification to themselves. This includes a common language, a common history and a shared culture, all of which people may want to pass on to their children. Nonetheless, the ranking can be used as a potential indicator of urban centres where separation in the school, work or residential setting might be reducing the level of social interaction between Indigenous and non-Indigenous Australians. In **Tables 4 and 5**, I explore this further by comparing the rate of mixed partnership in an Indigenous Area with a number of other characteristics of the area.

Using a regression approach, the dependent variable in the analysis is the percentage of the partnered Indigenous population in the area who are in a mixed (opposite-sex) partnership. Males and females are estimated separately with the first explanatory variable the percentage of the relevant partnered population who identified as being non-Indigenous, representing the default rate of mixed partnership under high levels of social interaction.

The remainder of the explanatory variables represent potential barriers to such interaction. The first of these barriers is a measure of residential segregation. If Indigenous and non-Indigenous Australians are spread unevenly across neighbourhoods within the areas, then

scope for social interaction will be less. There are many measures of segregation, which focus on different aspects of the geographic distribution of the population (Massey & Denton 1988). The most commonly used of these, the dissimilarity index, measures how evenly the Indigenous population is spread across urban neighbourhoods. Using the Statistical Area 1 (SA1)—the lowest level of geography in the ASGS—as a proxy for neighbourhoods, the dissimilarity index measures the degree of departure from a completely even distribution where every SA1 within an Indigenous Area has the same proportion of Indigenous and non-Indigenous Australians as the Indigenous Area average. The dissimilarity index ranges from 0 to 1, with higher values representing greater level of residential segregation. It can be interpreted as the proportion of Indigenous (or non-Indigenous) Australians who would hypothetically need to move SA1s to result in a perfectly even distribution across the area. If residential segregation is a barrier to mixed partnerships, then the index of residential segregation will have a negative association with mixed partnerships.

In order to capture the scope for social interaction across neighbourhoods, a separate variable is also included for the number of neighbourhoods (or SA1s) in the area. The greater the number of neighbourhoods, the greater the scope for interaction within the area across neighbourhoods (given that SA1s are constructed to have a similar number of people across Australia). Furthermore, Indigenous Areas with only one SA1 are excluded from the analysis as, for this group, the dissimilarity index is undefined.

The second explanatory variable to capture barriers to social interaction in the area is the percentage of the Indigenous population in the area who speak a language other than English at home. There are very few non-Indigenous Australians who speak an Indigenous language, and it might be expected that an Indigenous person who spoke an Indigenous language would be reluctant to partner with a non-Indigenous person due to communication difficulties and the potential disruption to the inter-generational transfer of their language.

The third barrier included in the model is the difference in the socioeconomic characteristics of the Indigenous and non-Indigenous population in the area. There is a long literature on assortative mating (Mare 1991) which shows that people tend to partner with people who have a similar education, income and occupation to themselves. An Indigenous person living in an area with high socioeconomic disparities will therefore find it more likely that a person in a similar socioeconomic position to themselves is Indigenous as opposed to non-Indigenous. This is measured through the Pooled Indigenous and Non-

TABLE 4. Summary statistics for model of factors associated with mixed partnerships, Indigenous males and females, Australia, 2011^a

Variable	Indigenous males		Indigenous females	
	Mean	Standard deviation	Mean	Standard deviation
Per cent of Indigenous population in mixed partnership	58.05	28.13	61.00	26.59
Per cent of partnered population of opposite sex who are non-Indigenous	89.68	21.02	90.23	20.33
Dissimilarity index of residential segregation ^b	0.41	0.15	0.41	0.15
Number of neighbourhoods ^b	149	218	149	218
Per cent of Indigenous population who speak an Indigenous language at home ^b	9.62	21.81	9.62	21.81
Difference between Indigenous and non-Indigenous socioeconomic outcomes ^b	48.20	20.71	48.20	20.71
Dissimilarity index of industry segregation	0.46	0.09	0.53	0.13
Number of observations	367		367	

Note: a. Excludes those who were away from home on the night of the census, those who are part of a same-sex couple, or those whose partner did not state their Indigenous status.

b. Measured for Indigenous males and females together.

Source: Customised calculations using the 2011 Census.

TABLE 5. Factors associated with mixed partnerships, Indigenous males and females, Australia, 2011

Variable name	Indigenous males		Indigenous females	
	Coefficient	P-value	Coefficient	P-value
Per cent of partnered population of opposite sex who are non-Indigenous	0.405	0.000	0.422	0.000
Dissimilarity index of residential segregation	0.346	0.953	4.523	0.328
Number of neighbourhoods	0.021	0.005	0.010	0.007
Per cent of Indigenous population who speak an Indigenous language at home	0.081	0.132	0.014	0.759
Difference between Indigenous and non-Indigenous socioeconomic outcomes	-0.842	0.000	-0.740	0.000
Dissimilarity index of industry segregation	-11.444	0.220	-30.420	0.000
Constant	63.518	0.000	71.374	0.000
Number of observations	367		367	
Adjusted R-squared	0.8106		0.8413	

Source: Customised calculations using the 2011 Census.

Indigenous Relative Socioeconomic Outcomes (PINIRSEO) index, developed and introduced in Biddle (2013b). This index summarises the socioeconomic distribution of the Indigenous population in an area separately from the non-Indigenous population. Nine measures of socioeconomic status are used across the areas of employment, education, income and housing, with areas ranked from 1 (the most advantaged) to 100 (the most disadvantaged). The variable used in the analysis in this paper is the difference between the Indigenous and non-Indigenous rank in the area with higher values indicating a greater level of disadvantage for the Indigenous compared to the non-Indigenous population.

The final explanatory variable in the model attempts to capture interaction in the workplace. According to Estlund (2003: 3), albeit writing with regards to America, 'the workplace is where working adults are most likely to associate regularly with someone of another race.' There is less scope for this in areas where heterosexual Indigenous males or females work in different workplaces to non-Indigenous females and males (respectively). Although there is no information on a person's workplace in the census, there is information on the industry in which a person works (which is defined based on their employer). I therefore include a variable which measures the level of industry segregation between employed Indigenous males/non-Indigenous females in the area (for the male observations) as well as a variable for the level of industry segregation between employed Indigenous females/non-Indigenous males (for the female observations). This is measured in a similar way to the residential segregation measure and varies from 0 (a completely even distribution) to 1 (a completely separate distribution).

The distribution of the dependent and explanatory variables in the model is summarised in **Table 4**, presented separately for the male and female estimations. In total, there are 367 locales, with areas excluded if they have a low Indigenous and non-Indigenous population, but also if they have only one SA1.

At the area level, partnered Indigenous females have a slightly higher level of mixed partnerships compared to partnered Indigenous males, as shown in **Table 4**. Indigenous females are also less likely to work in the same industry as the male non-Indigenous population of the area than Indigenous males are to work in the same industry as non-Indigenous females. Keeping these differences in mind, **Table 5** summarises the factors associated with the proportion of the population in the area who are Indigenous.

Results are calculated using the Ordinary Least Squares (OLS) command in STATA with robust standard areas. The coefficients should be interpreted as the predicted change

in this percentage from a one unit change in the relevant explanatory variable whilst holding all else constant. The p-values should be interpreted as the probability of obtaining a coefficient at least as large as that one in the table if the true value of the coefficient was actually zero. It is standard to treat coefficients that have a p-value of less than 0.05 as effectively zero. The third last line of **Table 5** gives the constant term or predicted value when all explanatory variables are set to zero, whereas the last line of the table gives the Adjusted R-Squared. This later diagnostic gives the amount of variation in the dependent variables explained by the model.

Before discussing the results, it should be noted that a number of robustness checks were conducted on the analysis. Specifically separate estimates were carried out: using a cut-off of 5 neighbourhoods; weighting for the size of the partnered Indigenous population in the area; and using a Generalized Linear Model (GLM) as opposed to OLS with a logit link function.¹ None of the results varied qualitatively under these different specifications.

There are also a number of caveats to keep in mind. The census gives no information on the individual's location prior to a partnership beginning. Second, it is only possible to identify the total number of surviving partnerships and not the total number of partnerships that have been created. Third, there is no information on the age of the potential pool of partners and their characteristics. Some of these limitations will potentially be overcome when individual data from the census becomes available. In the meantime though, these caveats should be kept in mind and the results taken as indicative only.

The first row of **Table 5** confirms that for partnered Indigenous males and females, living in an area where a large proportion of the partnered population of the opposite sex was non-Indigenous is associated with a high rate of mixed partnership. While this simply confirms previous results in this paper and elsewhere (Heard, Birrell & Khoo 2009), it should be kept in mind that the results for the other variables are estimated after holding this characteristic constant.

It was found that living in an area with a relatively large number of neighbourhoods was associated with a higher rate of mixed partnership, potentially because of the more geographically dispersed level of social interaction that this allowed. However, looking at the second variable in **Table 5**, there was no statistically significant association

 1. This GLM technique takes into account the fact that the dependent variable is bounded by 0 and 100 and transforms the dependent variable to ensure that predicted values fall within this range. As results didn't change using this more robust specification, OLS was preferred for ease of interpretation.

between the level of residential segregation in the area and the level of mixed partnership. This can be interpreted in two mutually reinforcing ways. First, Indigenous Australians are unlikely to find their partners from within their neighbourhood as opposed to wider area. Second, even in an area with a reasonably evenly distributed population, Indigenous Australians are more likely to interact with the Indigenous population in their neighbourhood as opposed to the non-Indigenous population.

There is support for both of these explanations in the literature. Writing with regards to the relationship between residential segregation and mixed partnerships in America, Hoelscher (2003: 680) states that 'Whites and blacks may occupy the same block and the ratio between blacks and whites may appear to be even, but the exact location within the block usually displayed a tendency toward microscale spatial separation.' Furthermore, with a decreasing relative cost of transport and mobility, rapid increases in post-school study and paid employment for females, and increasing social interaction over the internet, a much greater proportion of social interactions are occurring beyond the local level. This has been demonstrated for France (Bozon & Heran 1989), the Netherlands (Kalmijn & Flap 2001) and Sweden (Niedomysl, Östh & van Ham 2010) and these trends are likely to accelerate into the future as more partnerships are formed over the internet (Hitsch, Hortaçsu, & Ariely 2010).

There was no association with the proportion of Indigenous people who spoke an Indigenous language at home, showing that language may not be a large barrier to the type of social interaction between Indigenous Australians that leads to mixed partnerships. There was, however, a significant and quite large association between mixed partnerships and the difference in socioeconomic outcomes between Indigenous and non-Indigenous Australians in the area. While this variable was statistically significant for both males and females, the coefficient was somewhat larger for the former estimation. This demonstrates that for Indigenous males in particular, social interaction and mixed partnership is less likely to occur when their education, employment, income and housing circumstances are quite different from the surrounding non-Indigenous population. On the other hand, the result for the final variable in the model (industry segregation) shows that Indigenous females who live in areas where they (on average) work in very different industries to non-Indigenous males are less likely to form such partnerships.

Results presented in Table 5 should not be demonstrated as measuring causality. It is quite likely that some of the variables in the model are influenced by the level of mixed partnerships rather than the other way around. Furthermore, it is not necessarily the case that high rates

of mixed partnerships should be interpreted as a positive outcome for an area, even if it might provide an indication of positive social interaction between the Indigenous and non-Indigenous population. However, what the results do show is that the barriers to such interaction appear to be more likely to be socioeconomic and workplace based, rather than language or neighbourhood based.

Summary and concluding comments

Partnering with a non-Indigenous person is now the norm for opposite-sex Indigenous Australians. However, the results presented in this paper demonstrate that rates are much higher in major cities and regional centres, and that the vast majority of mixed partnerships are occurring in urban Australia.

Even within urban areas though, there is significant variation. Much of this variation is explained by the share of the partnered population in the area who are non-Indigenous. For an Indigenous person living in an area where most of those around you are non-Indigenous, it is not surprising that the availability of an Indigenous partner is limited. Furthermore, it would appear that in certain areas, differences in socioeconomic outcomes and industry of employment are barriers to the type of social interaction that might lead to mixed partnerships.

The dynamics of Indigenous population growth discussed in this series are likely to lead to continued growth in mixed partnerships into the future. As Indigenous Australians become more likely to live in urban areas (Biddle 2012) and more likely to be employed in similar industries to the non-Indigenous population (Gray, Howlett & Hunter 2013), they are more likely to interact with non-Indigenous Australians in the types of settings that lead to long-term partnership formation. Focusing on the non-Indigenous population for a moment as well, as the Indigenous population increases towards one-million-plus projected for 2031 (Biddle 2013a), the chances that a non-Indigenous person interacts and partners with an Indigenous person will also increase.

It remains to be seen whether the children from such mixed partnerships continue to identify as Indigenous. The conditions under which such identification occurs is an area of analysis that will become richer as new data from the census becomes available. A particularly rich source of data is the individual cross-sectional and longitudinal data that will be made available through the ABS 2011 Census Sample File and the 2006–2011 Statistical Longitudinal Census Dataset.²

2. For details on the SLCD, see <<http://www.abs.gov.au/websitedbs/censushome.nsf/home/data?opendocument#from-banner=LN>>.

An important segment of the population missed from this analysis is those Indigenous Australians who are not in a partnership. Many of these people are providing care to children and are hence relevant to the child's outcomes. Another limitation of this paper that warrants future scholarship is the situation of Indigenous Australians identified in the census as being in a same-sex couple. There were 556 Indigenous males and 836 Indigenous females identified as being in such a relationship in the 2011 Census. While this is small as a share of the overall Indigenous partnered population (around 0.5%), it is roughly equivalent to the share of non-Indigenous Australians who are a same-sex couple. Unfortunately, the way the data is currently provided, it is not possible to identify the percentage of these Indigenous Australians which are in a mixed partnership.

Despite these limitations and future work, there were a number of policy-relevant findings from the analysis. The main implication is that policies to improve the outcomes for Indigenous Australians cannot simply focus on the Indigenous population. For example, a policy designed to improve the child development outcomes of Indigenous children needs to take into account the fact that close to half of the Indigenous child population in many urban areas have a non-Indigenous mother. Furthermore, when attempting to reduce the rate of domestic violence or marital dissolution experienced by the Indigenous population (for example), it is important to keep in mind that the majority of the partners of Indigenous Australians who experience such traumatic life events are likely to be non-Indigenous. A final implication is that strengthening or maintaining a child's connection to Indigenous culture and language may be more difficult, or at the very least require different support in circumstances where one of their parents and many of their extended family members are non-Indigenous.

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